A cube with faces parallel to the x-, y- and z-axes has edge length 3 m. There is an electric field parallel to the z-axis. On the top face of the cube the field is \( \mathbf{E} = 20 \, \text{kN/C} \) and on the bottom face the field is \( \mathbf{E} = 10 \, \text{kN/C} \). What is the net charge inside the cube? (you can give your answer in terms of \( \varepsilon_0 \))

\[
\phi_{\text{Total}} = 180 - 90 = 90
\]

\[
\phi_{\text{Total}} = \frac{Q_{\text{enclosed}}}{\varepsilon_0} = 90
\]

\[
Q_{\text{enclosed}} = 90 \, \varepsilon_0 \, \text{C}
\]